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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/656,898	09/05/2003	Alexander Star	612,407-002	1540

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EXAMINER

RAO, SHRINIVAS H

ART UNIT	PAPER NUMBER
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2814

MAIL DATE	DELIVERY MODE
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05/07/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/656,898

Applicant(s)

STAR ET AL.

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) 13-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-11, 19 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on 2/20/2007 has been entered.

Therefore claim 1 as amended and claims 2 to 11 and 19 to 20 as previously recited are currently pending in the Application.

Claim 12 has been cancelled.

Claims 13 to 18 were previously withdrawn and must be cancelled as soon as possible.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 11, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dai (U.S. Patent No. 6,258,020, herein after Dai) previously applied and in view of Gardner (U.S. Patent No. 6,111,280, herein after Gardner) newly applied.

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With respect to claim 1, Dai teaches, from figs. 2 and 6, a nanostructure sensor for sensing a target species, comprising: at least one molecular nanostructure (20); at least two conducting elements (23) in electrical communication with the at least one a nanostructure (20); a polymer functionalization layer on the at least one nanostructure. (See column 5, lines 1-16 and lines 42-50 and column 6, lines 5-11 and lines 25-40.)

Dai does not specifically teach that the nanostructure sensor further comprises passivation material covering regions in which there is electrical communication between the at least two conduction elements and the at least one nanostructure. Although, Examiner takes the position that such passivation material deposited over metallization lines (electrodes) are conventional.

Gardner, drawn to chemical sensors, teaches, from fig. 1 a, the nanostructure sensor further comprising passivation material (14) covering regions in which there is electrical communication between the at least two conduction elements (17) and the at least one nano structure (17 in electrical communication CMOS or Bi-CMOS not shown in figure but described in col. 4 lines 22-29).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of invention, to have the device of Dai include a passivation layer

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covering the electrodes of the chemical sensor as disclosed by Gardner, since this is done in conventional semiconductor technology to protect the metallization lines from being exposed and damaged from environmental conditions. (See column 3, lines 45-65.)

With respect to claim 2, Dai teaches, from column 4, lines 23-40, that the nanostructure (20) includes carbon nanotubes.

With respect to claim 3, Dai teaches, from column 4, lines 1-10, that the nanostructure comprises a single-wall carbon nanotube (SWCNT).

With respect to claim 4, Dai teaches the nanostructure sensor wherein the at least two conducting elements (23) comprise metal electrodes. (See column 4, lines 23-40.)

With respect to claim 5, Dai teaches, from fig. 2, the nanostructure sensor wherein the at least two conducting elements (23) are in direct physical contact with the at least one nanostructure (20). (See column 4, lines 23-40.)

With respect to claim 6, Dai teaches the nanostructure sensor wherein the polymer layer is selected to interact with the target species. (See column 5, lines 43-50 and column 6, lines 5-11.)

With respect to claim 7, Dai teaches, from column 2, lines 28-30, the

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nanostructure sensor wherein the polymer layer on the at least one nanostructure (nanotube) is discontinuous (decorating).

With respect to claim 8, Dai teaches, from column 2, lines 28-30, the nanostructure wherein the polymer layer comprises more than one material.

With respect to claim 11, Dai teaches, from column 5, lines 5-16, a nanostructure sensor that comprises a gate electrode.

With respect to claim 19, Dai teaches, from figs. 1C and 3B, that the nanostructure (20) includes one or more carbon nanotubes. (See column 4, lines 41-57.)

With respect to claim 20, Dai teaches the nanostructure sensor wherein the polymer functionalization layer comprises a material providing an increase in response of the sensor to at least the target species. (See column 5, lines 43-50 and column 6, lines 5-11 .)

3. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dai (USPN 6,528,020) and Gardner (USPN 6,111,280) as applied to claim 1 above, in view of Buckley (USPN 5,674,752).

With respect to claim 9, Dai teaches all the limitations as stated above.

Dai does not specifically teach that the target species comprises ammonia - although, ammonia is a well-known target for CNT sensors (see ref. [V],

p.237) - and the polymer layer is polyethyleneimine (PEI).

However, Buckley, drawn to polymer-coated fibers for use as a chemical sensor, does teach, from fig. 10, the use of PEI as an ammonia sensor.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of invention, to have Dai nanostructure sensor device use PEI as the polymer over-layer since this material was known to detect ammonia as disclosed by Buckley, and it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dai (USPN 6,528,020) and Gardner (USPN 6,111,280) as applied to claim 1 above, in view of McGill (USPN 6,320,295).

With respect to claim 10, Dai teaches all the limitations as stated above.

Dai does not specifically teach that the target species comprises hydrogen - although, hydrogen is a well-known target for CNT sensors (see ref. [V], p.237, fig. 14)- and the polymer layer is polyethyleneimine (PEI).

However, McGill, drawn to chemical sensors, does teach, from column 7, lines 15-19, the use of PEI as a hydrogen sensor.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of invention, to have Dai's nanostructure sensor device use PEI as the polymer over-layer since this material was known to detect hydrogen as disclosed by McGill, and it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Response to Arguments

Applicant's arguments filed 2/20/2007 have been fully considered but they are not persuasive.

Applicants' have included the limitations previously rejected claim 12 in to claim 1 and argue that Dai does not anticipate claim 1. This argument is moot in view of the rejection over Dai in view of Gardner.

Similarly Applicants' argument w.r.t claim 9 that Buckley and Dai do not teach , "the nanostructure sensor further comprising passivation material covering regions in which there is electrical communication between the at least two conduction elements and the at least one nano structure" is moot in view of the rejection over Gardner .

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Applicants' argument w.r.t claim 10 that McGill allegedly does not teach nanostructures is impermissible piece meal analysis of the outstanding rejection which was based on the combined teachings of Dai and McGill and as Dai teaches nanostructures it is not necessary for McGill to repeat the same teachings again. See *In re Keller* 208 USPQ 871 (CCPA1981).

Applicants' argument w.r.t claims 6 and 8 that Gardner allegedly does not teach nanoscale polymer (cl. 6) and having more than material (cl.8) is not persuasive because the applied primary reference Dai teaches both these elements and it is not necessary for the secondary reference to repeat these teachings again.

Therefore all of Applicants' arguments are not persuasive.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (571) 272-1718. The examiner can normally be reached on 8.30-5.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1714. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

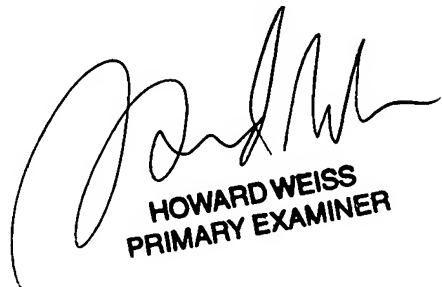
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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Steven H. Rao

Patent Examiner

April 27, 2007.


HOWARD WEISS
PRIMARY EXAMINER